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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,643	02/06/2002	Scot A. Kellar	42P12752	4503

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EXAMINER

WILLIAMS, ALEXANDER O

ART UNIT PAPER NUMBER

2826

DATE MAILED: 01/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/066,643

Applicant(s)

KELLAR ET AL.

Examiner

Alexander O Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 15-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

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Serial Number: 10/0666643 Attorney's Docket #: 42P12752  
Filing Date: 2/6/2002;

Applicant: Kellar et al.

Examiner: Alexander Williams

Applicant's election of Group I (claims 1 to 7 and 15 to 20), filed 10/31/03, has been acknowledged.

This application contains claims 8 to 14 drawn to an invention non-elected without traverse.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 to 7 and 15 to 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakaoka et al. (U.S. Patent # 6,583,512 B2) in view of Burns (U.S. Patent # 4,607,779).

1. Nakaoka et al. (figures 1 to 18D) specifically figure 12A show a three-dimensional (3-D) integrated chip system, comprising: a first wafer **36** including one or more integrated circuit (IC) devices; a second wafer **20** including one or more integrated circuit (IC) devices; and a metal bonding layer **23** deposited on opposing surfaces of the first and second wafers at designated locations to establish electrical connections between active IC devices on the first and second wafers and to provide metal bonding between the adjacent first and second wafers, when the first wafer is pressed against the second wafer using a bladder press **40** to account for a height differences of the metal bonding layer across the opposing surfaces of the first and second wafers, but fail to explicitly show when the first wafer is pressed against the second wafer using a flexible bladder press to account for a height differences of the metal bonding layer across the opposing surfaces of the first and second wafers.

Burns is cited for showing a non-impact thermocompression gang-bonding method. Specifically, Burns (figures 1 to 4) specifically figure 4 discloses a wafer using a flexible bladder press (**force applied at 25 directed to the various 26s applying pressure to 20 onto the individual IC CHIPS**) to account for a height differences of a bonding layer **20** for the purpose of eliminating semiconductor device fracturing while achieving bonds that are unexpectedly better than those achieved using impact thermodes.

2. The three-dimensional (3-D) integrated chip system as claimed in claim 1, the combination with Nakaoka et al. show wherein the metal bonding layer includes a plurality of Copper (Cu) lines **23** on opposing surface of the first and second wafers to serve as electrical contacts between active IC devices on both the first and second wafers.

3 and 17. The three-dimensional (3-D) integrated chip system as claimed in claims 1 or 17, the combination with Burns showing wherein the flexible bladder press is a hollow steel container including an input valve arranged to input air pressure, and a bottom membrane positioned over the surface of the first wafer to apply the pressure differently at different points on the first wafer as the first wafer is pressed against the second wafer to account for the height differences of the metal bonding layer across the opposing surfaces of the first and second wafers.

4 and 18. The three-dimensional (3-D) integrated chip system as claimed in claim 1 or 18, the combination with Burns showing wherein the pressure required to account for the height differences of the metal bonding layer across the opposing surfaces of the first and second wafers is determined based on the equation provided by Applicant.

5 and 19. The three-dimensional (3-D) integrated chip system as claimed in claim 1, the combination with Burns showing wherein the first wafer is thinner than the second wafer to conform to the height differences of the metal bonding layer across the opposing surfaces of the first and second wafers.

6 and 20. The three-dimensional (3-D) integrated chip system as claimed in claim 1, the combination with Burns showing wherein the flexible bladder press is an autoclave including an input valve arranged to input high-pressure gas into a chamber; a heater arranged to heat the gas at a predetermined temperature; and at least one vacuum bag arranged to contain the first and second wafers in position for metal bonding.

7. The three-dimensional (3-D) integrated chip system as claimed in claim 6, the combination with Burns showing wherein the vacuum bag is a flexible bag that is evacuated and then sealed to ensure that the first and second wafers are bonded, via the metal bonding layer.

15. Nakaoka et al. (figures 1 to 18D) specifically figure 12A show a three-dimensional (3-D) integrated chip system, comprising: a first wafer **36** including one or more integrated circuit (IC) devices, and metallic bumps **23** arranged to electrical interconnection; a second wafer **20** including one or more integrated circuit (IC) devices, and metallic bumps **23** arranged for electrical interconnection and with alignment with the first wafer to form a stack; and a bladder press **40** arranged to press the first wafer against the second wafer to bond the metallic bumps on the surface of the first wafer with the metallic bumps on the surface of the second wafer and establish electrical connections between active IC devices on the adjacent wafers, but fail to explicitly show a flexible bladder press arranged to press the first wafer against the second wafer to bond the metallic bumps on the surface of the first wafer with the metallic bumps on the surface of the second wafer and establish electrical connections between active IC devices on the adjacent wafers.

Burns is cited for showing a non-impact thermocompression gang-bonding method. Specifically, Burns (figures 1 to 4) specifically figure 4 discloses a wafer using a flexible bladder press (**force applied at 25 directed to the various 26s applying pressure to 20 onto the individual IC CHIPS**) to account for a height differences of a

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bonding layer **20** for the purpose of eliminating semiconductor device fracturing while achieving bonds that are unexpectedly better than those achieved using impact thermodes.

16. The three-dimensional (3-D) integrated chip system as claimed in claim 15, the combination with Burns showing wherein the flexible bladder press is arranged to press the first wafer against the second wafer to account for height differences of the metallic bumps across the opposing surfaces of the first and second wafers.

Therefore, it would have been obvious to one of ordinary skill in the art to use Burns' flexible bladder press to modify Nakaoka et al.'s bladder press for the purpose of eliminating semiconductor device fracturing while achieving bonds that are unexpectedly better than those achieved using impact thermodes.

The listed references are cited as of interest to this application, but not applied at this time.

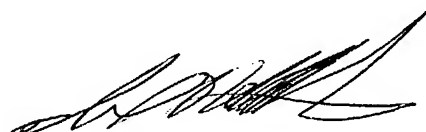
Field of Search	Date
U.S. Class and subclass: 257/E21.519,E21.505-E21.515,688,777,686,618,723,777, 778, 738,737,777,778,797,785 156/59 438/108,109,117,119,690 702/1+ 703/1+ 705/1+	1/19/04
Other Documentation: foreign patents and literature in 257/E21.519,E21.505- E21.515, 688,777,686,618,723,777,778,738,737, 777,778, 797,785 156/59 438/108,109,117,119,690 702/1+ 703/1+ 705/1+	1/19/04
Electronic data base(s): U.S. Patents EAST	1/19/04

***Papers related to this application may be submitted to Technology Center 2800 by facsimile transmission. Papers should be faxed to Technology Center 2800 via the Technology Center 2800 Fax center located in Crystal Plaza 4-5B15. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Technology Center 2800 Fax Center number is (703) 308-7722 or 24. Only Papers related to Technology Center 2800 APPLICATIONS SHOULD BE FAXED to the GROUP 2800 FAX CENTER.***

Any inquiry concerning this communication or any earlier communication from the examiner should be directed to ***Examiner Alexander Williams*** whose telephone number is **(703) 308-4863**.

Any inquiry of a general nature or relating to the status of this application should be directed to the ***Technology Center 2800 receptionist*** whose telephone number is **(703) 308-0956**.

1/21/04

A handwritten signature in black ink, appearing to read 'A. Williams', with a stylized flourish extending from the end.

Primary Patent Examiner  
Alexander O. Williams